

Amendment

In response to the Office Action dated May 28, 2002, please amend the application as follows:

IN THE CLAIMS:

Please cancel Claims 4 and 9-14 without prejudice to or disclaimer of the recited subject matter.

Please amend Claims 1, 5 and 15-19 as follows. Please add Claims 20 and 21 as follows. A marked-up version showing the amendments to the claims is included in the attached appendix. For the Examiner's convenience, all of the pending claims are presented, regardless of whether the claim is currently being amended.

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1. (Amended) A marker layout method for laying out markers in a real space as position indices upon presenting a mixed reality space, comprising the step of:

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(laying out the markers to have a positional relationship) that allows a given player not to observe markers to be used by ~~only~~ another player when a plurality of players who observe the mixed-reality space within different movable ranges observe the mixed reality space,

wherein the markers to be used by only the given player are laid out at positions hidden by real objects when the markers are observed from the other player.

2. (Unamended) The method according to claim 1, wherein a visible feature of the markers to be used by only the other player is similar to a visible feature of the markers used by the given player.

3. (Unamended) The method according to claim 2, wherein the visible feature includes at least one of color, texture, shape, and size of the marker.

4. (Cancelled)

Az 4
5. (Amended) The method according to claim 1, wherein the real objects are laid out for an application that uses the mixed reality space.

6. (Unamended) The method according to claim 1, wherein the markers to be laid out include markers shared by a plurality of players.

7. (Unamended) The method according to claim 1, wherein the markers have a common color.

8. (Unamended) A mixed reality apparatus for computing and/or correcting location/posture information of a player using markers laid out by a marker layout method of claim 1.

9 -14. (Cancelled)

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15. (Amended) A mixed reality space image generation method for generating a mixed reality space image which makes a player experience mixed reality by mixing a real space in which markers serving as position indices are laid out, and a virtual space, comprising:

a marker detection step of detecting the markers from image data obtained by sensing the real space from a substantially viewpoint position of the player;

a correcting step of correcting location/posture information of the player based on the markers detected by said marker detection step; and

a mixed reality space image generation step of generating a mixed reality space image to be observed by the player, so the player observes virtual object images that do not include any images of the markers in marker regions including the markers from the image data,

wherein said mixed reality space image generation step includes a step of substituting or overlaying images of the marker regions by predetermined virtual object images.

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16. (Amended) A mixed reality space image generation method for generating a mixed reality space image which makes a player experience mixed reality by mixing a real space in which markers serving as position indices are laid out, and a virtual space, comprising:

a marker detection step of detecting the markers from image data obtained by sensing the real space from a substantially viewpoint position of the player;

a correcting step of correcting location/posture information of the player based on the markers detected by said marker detection step; and

a mixed reality space image generation step of generating a mixed reality space image to be observed by the player, so the player observes virtual object images that do not include any images of the markers in marker regions including the markers from the image data,

wherein said mixed reality space image generation step includes a step of substituting or overlaying all the markers in the image data with predetermined virtual object images.

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¹⁰ 17. (Amended) The method according to claim ⁸ 15, wherein the predetermined virtual object images are images of plane patches with the same or similar texture, size, location and posture of respective marker regions before the markers are laid out.

¹¹ 18. (Amended) A computer readable storage medium that stores a program which can be executed by a computer, said program making the computer perform the steps of:

a marker detection step of detecting markers, serving as position indices, from image data obtained by sensing a real space from a substantially viewpoint position of a player;

a correcting step of correcting location/posture information of the player based on the markers detected by said marker detection step; and

a mixed reality space image generation step of generating a mixed reality space image to be observed by the player, so the player observes virtual object images that do not include any images of the markers in marker regions including the markers from the image data,

wherein said mixed reality space image generation step includes substituting or overlaying images of the marker regions by predetermined virtual object images.

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19. (Amended) A computer readable storage medium that stores a program which can be executed by a computer, said program making the computer perform the steps of:

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cont.
a marker detection step of detecting the markers serving as position indices from image data obtained by sensing a real space from a substantially viewpoint position of a player;

a correcting step of correcting location/posture information of the player based on the markers detected by said marker detection step; and

a mixed reality space image generation step of generating a mixed reality space image to be observed by the player, so the player observes virtual object images that do not include any images of the markers in marker regions including the markers from the image data,

wherein said mixed reality space image generation step includes substituting or overlaying an image of a region including all the markers in the image data by predetermined virtual object images.

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--20. (New) A mixed reality apparatus for providing a mixed reality space

sub B1 shared by a plurality of players, comprising:

an input unit adapted to input a real space image representing the real space;

a marker detecting unit adapted to extract pixels having a color that is predefined as a marker from the real space image, perform a labeling process to detect marker regions, and detect positions of markers in the marker regions;

a head location/posture estimation unit to estimate a location/posture of a viewpoint of a given player using the detected marker positions;

A4 a mixed reality space image generation unit adapted to generate a virtual space image to be observed by the given player based on the location/posture of the viewpoint of the given player and model information; and

an image combining unit adapted to generate a mixed reality space image by combining the real space image with the virtual space image,

wherein the markers are laid out in the real space so that the markers to be used by only the given player are laid out at positions hidden by real objects when the markers are observed from the other player.

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21. (New) A method for providing a mixed reality space shared by a plurality of players, comprising:

an input step of inputting a real space image representing the real space;

a marker detecting step of extracting pixels having a color that is predefined as a marker from the real space image, performing a labeling process to detect marker regions, and detecting positions of markers in the marker regions;